

## ABSTRACT OF THE DISCLOSURE

A photodiode array includes a plurality of arrayed individual diode devices.

The arrayed diode devices include at least one active photodiode and at least one  
5 reference diode. A bias control circuit for the array monitors operation of the  
reference diode at an applied first bias voltage and adjusts that applied first bias  
voltage until optimal reference diode operation is reached. A second bias voltage  
having predetermined relationship to the first bias voltage is applied to the active  
photodiode to optimally configure array operation. More specifically, an  
10 operational characteristic of the reference diode at the first bias voltage is monitored  
and compared to a reference value. As a result of this comparison, the circuit  
adjusts the applied first and second bias voltage in order to drive the reference diode  
measured characteristic to substantially match the reference value. The operational  
characteristic that is measured may comprise reference diode responsivity or  
15 reference diode output current, and may be based on either electrical or optical  
device operation. Each avalanche photodiode semiconductor structure may have a  
conventional reverse biased pn junction semiconductor structure providing a high  
field region as is well known in the art. An enhanced semiconductor structure may  
also be utilized wherein a heavily doped layer that is physically separate from the pn  
20 junction is also included to provide a source of charge carriers that are swept into the  
high field region.